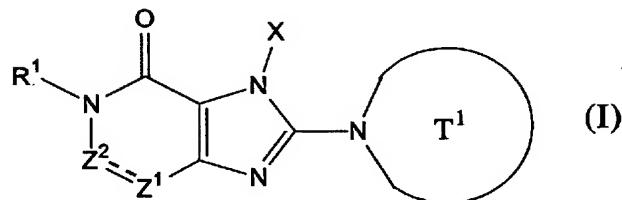


CLAIMS

1. A preventive or therapeutic agent for multiple sclerosis, which comprises the compound represented by formula (I), or a salt or hydrate thereof,

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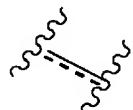


[wherein,

10 T^1 represents a mono- or bicyclic 4- to 12-membered heterocyclic group comprising one or two nitrogen atoms in a ring, which may have substituents;

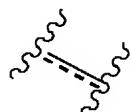
15 X represents a C_{1-6} alkyl group that may have a substituent, a C_{2-6} alkenyl group that may have a substituent, a C_{2-6} alkynyl group that may have a substituent, a C_{6-10} aryl group that may have a substituent, a 5- to 10-membered heteroaryl group that may have a substituent, a C_{6-10} aryl C_{1-6} alkyl group that may have a substituent, or a 5- to 10-membered heteroaryl C_{1-6} alkyl group that may have a substituent;

in formula (I), the following formula



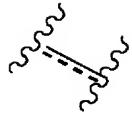
20 represents a single or double bond;

and when the formula



25 represents a single bond, Z^1 represents a group represented by the formula $-NR^2-$, and Z^2 represents a carbonyl group;

when the formula



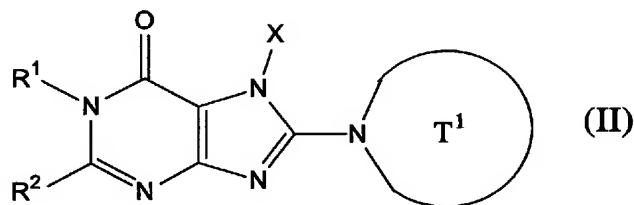
represents a double bond, Z^1 and Z^2 each independently represent a nitrogen atom or a group represented by the formula $-CR^2=$;

5 R^1 and R^2 each independently represent a group represented by the formula $-A^0-A^1-A^2$
 (wherein, A^0 represents a single bond or a C_{1-6} alkylene group that may have one to three groups selected from a substituent group B described below;
 A^1 represents a single bond, an oxygen atom, a sulfur atom, a sulfinyl group, a sulfonyl group, a carbonyl group, a formula $-O-CO-$, a formula $-CO-O-$, a formula $-NR^A-$, a formula $-CO-NR^A-$, a formula $-NR^A-CO-$, a formula $-SO_2-NR^A-$, or a formula $-NR^A-SO_2-$;
 A^2 and R^A each independently represent a hydrogen atom, a halogen atom, a cyano group, a guanidino group, a C_{1-6} alkyl group, a C_{3-8} cycloalkyl group, a C_{3-8} cycloalkenyl group, a C_{2-6} alkenyl group, a C_{2-6} alkynyl group, a C_{6-10} aryl group, a 5- to 10-membered heteroaryl group, a 4- to 8-membered heterocyclic group, a 5- to 15
 10-membered heteroaryl C_{1-6} alkyl group, a C_{6-10} aryl C_{1-6} alkyl group, or a C_{2-7} alkyl carbonyl group;
 with the proviso that A^2 and R^A may each independently have one to three groups selected from substituent group B described below);
 20 when Z^2 represents the formula $-CR^2=$, R^1 and R^2 may together form a 5- to 7-membered ring;
 <Substituent group B>
 substituent group B refers to a group consisting of:
 a hydroxyl group, a mercapto group, a cyano group, a nitro group, a halogen atom, a trifluoromethyl group, a trifluoromethoxy group, an alkylatedioxy group, a C_{1-6} alkyl group that 25
 25 may have a substituent, a C_{3-8} cycloalkyl group, a C_{2-6} alkenyl group, a C_{2-6} alkynyl group, a C_{6-10} aryl group, a 5- to 10-membered heteroaryl group, a 4- to 8-membered heterocyclic group, a C_{1-6} alkoxy group, a C_{1-6} alkylthio group, groups represented by the formulae $-SO_2-NR^{B1}-R^{B2}$, $-NR^{B1}-CO-R^{B2}$, and $-NR^{B1}-R^{B2}$ (where R^{B1} and R^{B2} each independently represent a hydrogen atom or a C_{1-6} alkyl group), a group represented by the formula $-CO-R^{B3}$ (where R^{B3} represents a 30
 30 4- to 8-membered heterocyclic group), and groups represented by the formulae $-CO-R^{B4}-R^{B5}$ and $-CH_2-CO-R^{B4}-R^{B5}$ (where R^{B4} represents a single bond, an oxygen atom, or a formula $-NR^{B6}-$; R^{B5} and R^{B6} each independently represent a hydrogen atom, a C_{1-6} alkyl group, a C_{3-8} cycloalkyl group, a C_{2-6} alkenyl group, a C_{2-6} alkynyl group, a C_{6-10} aryl group, a 5- to 10-membered heteroaryl group, a 4- to 8-membered heterocyclic C_{1-6} alkyl group, a C_{6-10} aryl C_{1-6} alkyl group,

or a 5-10-membered heteroaryl C_{1-6} alkyl group)].

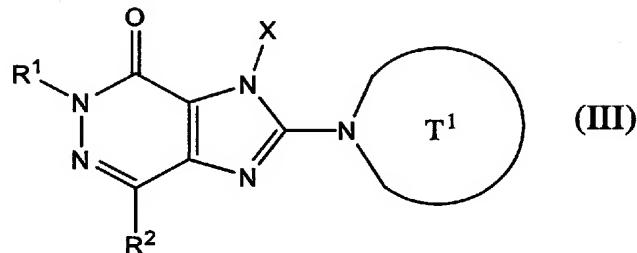
2. A preventive or therapeutic agent for multiple sclerosis, which comprises the compound represented by formula (II), or a salt or hydrate thereof,

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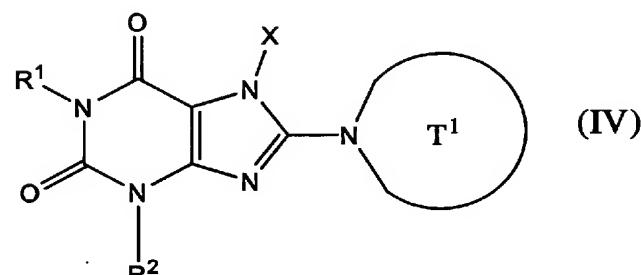
[wherein, X, R^1 , R^2 and T^1 have the same meaning as X, R^1 , R^2 and T^1 of claim 1].

10 3. A preventive or therapeutic agent for multiple sclerosis, which comprises the compound represented by formula (III), or a salt or hydrate thereof,



15 [wherein, X, R^1 , R^2 and T^1 have the same meaning as X, R^1 , R^2 and T^1 of claim 1].

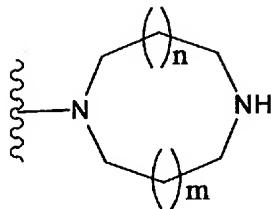
4. A preventive or therapeutic agent for multiple sclerosis, which comprises the compound represented by formula (IV), or a salt or hydrate thereof,



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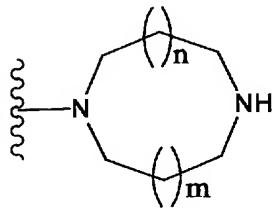
[wherein, X, R¹, R² and T¹ have the same meaning as X, R¹, R² and T¹ of claim 1].

5. A preventive or therapeutic agent for multiple sclerosis, which comprises the compound of any one of claims 1 to 4, or a salt or hydrate thereof, wherein T¹ described above is a group represented by the following formula:



10 (where n and m each independently represent zero or one), an azetidin-1-yl group that may have a substituent, a pyrrolidine-1-yl group that may have a substituent, a piperidine-1-yl group that may have a substituent, or an azepan-1-yl group that may have a substituent.

15 6. A preventive or therapeutic agent for multiple sclerosis, which comprises the compound of any one of claims 1 to 4, or a salt or hydrate thereof, wherein T¹ described above is a group represented by the following formula:



20 (where n and m each independently represent zero or one), an azetidin-1-yl group that may have an amino group, a pyrrolidin-1-yl group that may have an amino group, a piperidin-1-yl group that may have an amino group, or an azepan-1-yl group that may have an amino group.

25 7. A preventive or therapeutic agent for multiple sclerosis, which comprises the compound of any one of claims 1 to 4, or a salt or hydrate thereof, wherein T¹ described above is a piperazine-1-yl group or a 3-aminopiperidine-1-yl group.

8. A preventive or therapeutic agent for multiple sclerosis, which comprises the compound of any one of claims 1 to 4, or a salt or hydrate thereof, wherein T¹ described above is

a piperazine-1-yl group.

9. A preventive or therapeutic agent for multiple sclerosis, which comprises the compound according to any one of claims 1 to 8, or a salt or hydrate thereof, wherein X

5 described above is a group represented by the formula $-X^1-X^2$ (where X^1 represents a single bond or a methylene group that may have a substituent; X^2 represents a C_{2-6} alkenyl group that may have a substituent, a C_{2-6} alkynyl group that may have a substituent, or a phenyl group that may have a substituent).

10 10. A preventive or therapeutic agent for multiple sclerosis, which comprises the compound of any one of claims 1 to 8, or a salt or hydrate thereof, wherein X described above is a group represented by the formula $-X^{11}-X^{12}$ (where X^{11} represents a single bond or a methylene group; X^{12} represents a C_{2-6} alkenyl group, a C_{2-6} alkynyl group, or a phenyl group that may have a substituent).

15 11. A preventive or therapeutic agent for multiple sclerosis, which comprises the compound of claim 9 or 10, or a salt or hydrate thereof, wherein the phenyl group that may have at position 2 a substituent selected from the group consisting of:
a hydroxyl group, a fluorine atom, a chlorine atom, a methyl group, an ethyl group, a
20 fluoromethyl group, a vinyl group, a methoxy group, an ethoxy group, an acetyl group, a cyano group, a formyl group, and a C_{2-7} alkoxy carbonyl group.

12. A preventive or therapeutic agent for multiple sclerosis, which comprises the compound of any one of claims 1 to 8, or a salt or hydrate thereof, wherein X is a
25 3-methyl-2-buten-1-yl group, a 2-butyne-1-yl group, a benzyl group, or a 2-chlorophenyl group.

13. A preventive or therapeutic agent for multiple sclerosis, which comprises the compound of any one of claims 1 to 8, or a salt or hydrate thereof, wherein X is a 2-butyne-1-yl group.

30 14. A preventive or therapeutic agent for multiple sclerosis, which comprises the compound of any one of claims 1 to 13, or a salt or hydrate thereof, wherein R^1 is a hydrogen atom or a group represented by the formula $-A^{10}-A^{11}-A^{12}$
35 (wherein, A^{10} represents a C_{1-6} alkylene group that may have one to three groups selected from substituent group C described below;
 A^{11} represents a single bond, an oxygen atom, a sulfur atom, or a carbonyl group;

A^{12} represents a hydrogen atom, a C_{6-10} aryl group that may have one to three groups selected from substituent group C described below, a 5- to 10-membered heteroaryl group that may have one to three groups selected from substituent group C described below, a 5- to 10-membered heteroaryl C_{1-6} alkyl group that may have one to three groups selected from substituent group C

5 described below, or a C_{6-10} aryl C_{1-6} alkyl group that may have one to three groups selected from substituent group C described below);

<Substituent group C>

substituent group C refers to a group consisting of:

a hydroxyl group, a nitro group, a cyano group, a halogen atom, a C_{1-6} alkyl group, a C_{1-6} alkoxy group, a C_{1-6} alkylthio group, a trifluoromethyl group, a group represented by the formula $-NR^{C1}-R^{C2}$ (where R^{C1} and R^{C2} each independently represent a hydrogen atom or a C_{1-6} alkyl group), and groups represented by the formulae $-CO-R^{C3}-R^{C4}$ and $-CH_2-CO-R^{C3}-R^{C4}$ (where R^{C3} represents a single bond, an oxygen atom, or a formula $-NR^{C5}-$; and R^{C4} and R^{C5} each independently represent a hydrogen atom or a C_{1-6} alkyl group).

15

15. A preventive or therapeutic agent for multiple sclerosis, which comprises the compound of any one of claims 1 to 13, or a salt or hydrate thereof, wherein R^1 described above is a hydrogen atom, a C_{1-6} alkyl group that may have one to three groups selected from substituent group C described below, a 5- to 10-membered heteroaryl C_{1-6} alkyl group that may have one to three groups selected from substituent group C described below, or a C_{6-10} aryl C_{1-6} alkyl group that may have one to three groups selected from substituent group C described below;

<Substituent group C>

substituent group C refers to a group consisting of:

25 a hydroxyl group, a nitro group, a cyano group, a halogen atom, a C_{1-6} alkyl group, a C_{1-6} alkoxy group, a C_{1-6} alkylthio group, a trifluoromethyl group, a group represented by the formula $-NR^{C1}-R^{C2}$ (where R^{C1} and R^{C2} each independently represent a hydrogen atom or a C_{1-6} alkyl group), and groups represented by the formulae $-CO-R^{C3}-R^{C4}$ and $-CH_2-CO-R^{C3}-R^{C4}$ (where R^{C3} represents a single bond, an oxygen atom, or a formula $-NR^{C5}-$; and R^{C4} and R^{C5} each independently represent a hydrogen atom or a C_{1-6} alkyl group).

30

16. A preventive or therapeutic agent for multiple sclerosis, which comprises the compound of claim 14 or 15, or a salt or hydrate thereof, wherein substituent group C consists of a cyano group, a C_{1-6} alkoxy group, a C_{2-7} alkoxycarbonyl group, and halogen atom.

35

17. A preventive or therapeutic agent for multiple sclerosis, which comprises the

compound of any one of claims 1 to 13, or a salt or hydrate thereof, wherein R¹ described above is a methyl group, a cyanobenzyl group, fluorocyanobenzyl group, a phenethyl group, a 2-methoxyethyl group, or a 4-methoxycarbonylpyridin-2-yl group.

5 18. A preventive or therapeutic agent for multiple sclerosis, which comprises the compound of any one of claims 1 to 13, or a salt or hydrate thereof, wherein R¹ is a methyl group or a 2-cyanobenzyl group.

10 19. A preventive or therapeutic agent for multiple sclerosis, which comprises the compound of any one of claims 1 to 18, or a salt or hydrate thereof, wherein R² is a hydrogen atom, a cyano group, or a group represented by the formula -A²¹-A²² (where A²¹ represents a single bond, an oxygen atom, a sulfur atom, a sulfinyl group, a sulfonyl group, a carbonyl group, a formula -O-CO-, a formula -CO-O-, a formula -NR^{A2}-, a formula -CO-NR^{A2}-, or a formula -NR^{A2}-CO-; A²² and R^{A2} each independently represent a hydrogen atom, a cyano group, a C₁₋₆ alkyl group, a C₃₋₈ cycloalkyl group, a C₂₋₆ alkenyl group, a C₂₋₆ alkynyl group, a C₆₋₁₀ aryl group, a 5- to 10-membered heteroaryl group, a 4- to 8-membered heterocyclic group, a 5- to 15

10-membered heteroaryl C₁₋₆ alkyl group, or a C₆₋₁₀ aryl C₁₋₆ alkyl group; with the proviso that A²² and R^{A2} each independently may have one to three groups selected from substituent group D described below);

20 <Substituent group D>

substituent group D refers to a group consisting of:

a hydroxyl group, a cyano group, a nitro group, a halogen atom, a C₁₋₆ alkyl group, a C₁₋₆ alkoxy group, a C₁₋₆ alkylthio group, a trifluoromethyl group, a group represented by the formula -NR^{D1}-R^{D2} (where R^{D1} and R^{D2} each independently represent a hydrogen atom or a C₁₋₆ alkyl

25 group), a group represented by the formula -CO-R^{D3} (where R^{D3} represents a 4- to 8-membered heterocyclic group), and a group represented by the formula -CO-R^{D4}-R^{D5} (where R^{D4} represents a single bond, an oxygen atom, or a formula -NR^{D6}-; R^{D5} and R^{D6} each independently represent a hydrogen atom, a C₃₋₈ cycloalkyl group, or a C₁₋₆ alkyl group).

30 20. A preventive or therapeutic agent for multiple sclerosis, which comprises the compound of any one of claims 1 to 18, or a salt or hydrate thereof, wherein R² described above is a hydrogen atom, a cyano group, a carboxy group, a C₂₋₇ alkoxycarbonyl group, a C₁₋₆ alkyl group, a group represented by the formula -CONR^{D7}R^{D8} (wherein R^{D7} and R^{D8} each independently represent a hydrogen atom or a C₁₋₆ alkyl group), or a group represented by the

35 formula -A²³-A²⁴ (where A²³ represents an oxygen atom, a sulfur atom, or a formula -NR^{A3}-; A²⁴ and R^{A3} each independently represent a hydrogen atom, a C₁₋₆ alkyl group that may have a group

selected from substituent group D1 described below, a C₃₋₈ cycloalkyl group that may have a group selected from substituent group D1 described below, a C₂₋₆ alkenyl group that may have a group selected from substituent group D1 described below, a C₂₋₆ alkynyl group that may have a group selected from substituent group D1 described below, a phenyl group that may have a

5 group selected from substituent group D1 described below, or a 5- to 10-membered heteroaryl group that may have a group selected from substituent group D1 described below);

<Substituent group D1>

substituent group D1 refers to a group consisting of:

a carboxy group, a C₂₋₇ alkoxycarbonyl group, a C₁₋₆ alkyl group, a group represented by the

10 formula -CONR^{D7}R^{D8} (wherein R^{D7} and R^{D8} each independently represent a hydrogen atom or a C₁₋₆ alkyl group), a pyrrolidin-1-ylcarbonyl group, a C₁₋₆ alkyl group, and a C₁₋₆ alkoxy group.

21. A preventive or therapeutic agent for multiple sclerosis, which comprises the compound of any one of claims 1 to 18, or a salt or hydrate thereof, wherein R² described above

15 is a hydrogen atom, a methyl group, a cyano group, a C₁₋₆ alkoxy group, or a group represented by the formula -A²⁵-A²⁶ (where A²⁵ represents an oxygen atom, a sulfur atom, or a formula -NR^{A4}-; A²⁶ and R^{A4} each independently represent a hydrogen atom, a C₁₋₆ alkyl group that may have a group selected from substituent group D1 described below, a C₃₋₈ cycloalkyl group that may have a group selected from substituent group D1 described below, or a phenyl group that

20 may have a group selected from substituent group D1 described below);

<Substituent group D1>

substituent group D1 refers to a group consisting of:

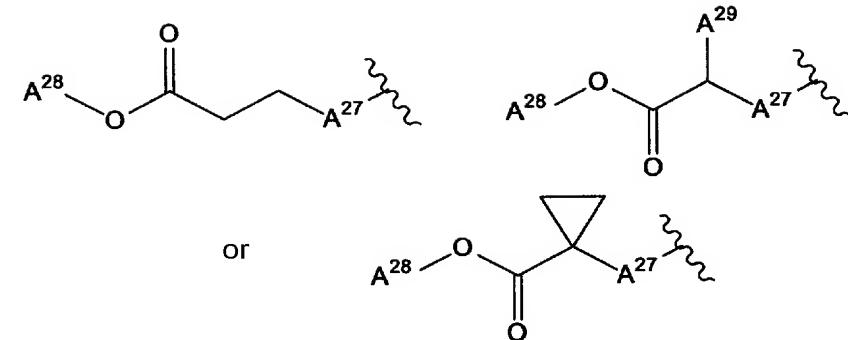
a carboxy group, a C₂₋₇ alkoxycarbonyl group, a C₁₋₆ alkyl group, a group represented by the

25 formula -CONR^{D7}R^{D8} (wherein R^{D7} and R^{D8} each independently represent a hydrogen atom or a C₁₋₆ alkyl group), a pyrrolidin-1-ylcarbonyl group, a C₁₋₆ alkyl group, and a C₁₋₆ alkoxy group.

22. A preventive or therapeutic agent for multiple sclerosis, which comprises the compound of any one of claims 1 to 18, or a salt or hydrate thereof, wherein R² described above

is a hydrogen atom, a cyano group, a methoxy group, a carbamoylphenyloxy group, or a group

30 represented by the following formula:



(where A^{27} represents an oxygen atom, a sulfur atom, or $-NH-$;
 A^{28} and A^{29} each independently represent a hydrogen atom or a C_{1-6} alkyl group).

5 23. A preventive or therapeutic agent for multiple sclerosis, which comprises the compound of any one of claims 1 to 18, or a salt or hydrate thereof, wherein R^2 described above is a hydrogen atom, a cyano group, or a 2-carbamoylphenoxy group.

10 24. A preventive or therapeutic agent for multiple sclerosis, which comprises the compound of claim 1, or a salt or hydrate thereof, wherein the compound represented by formula (I) is any one of the compounds selected from the group consisting of:
 7-(2-butynyl)-1,3-dimethyl-8-(piperazin-1-yl)-3,7-dihydropurine-2,6-dione,
 7-(2-butynyl)-2-cyano-1-methyl-8-(piperazin-1-yl)-1,7-dihydropurin-6-one,
 15 3-(2-butynyl)-5-methyl-2-(piperazin-1-yl)-3,5-dihydroimidazo[4,5-d]pyridazin-4-one,
 2-(3-aminopiperidin-1-yl)-3-(2-butynyl)-5-methyl-3,5-dihydroimidazo[4,5-d]pyridazin-4-one,
 2-[7-(2-butynyl)-1-methyl-6-oxo-8-(piperazin-1-yl)-6,7-dihydro-1H-purin-2-yl]benzamide,
 7-(2-butynyl)-1-(2-cyanobenzyl)-6-oxo-8-(piperazin-1-yl)-6,7-dihydro-1H-purine-2-carbonitrile,
 and
 20 2-[3-(2-butynyl)-4-oxo-2-(piperazin-1-yl)-3,4-dihydroimidazo[4,5-d]pyridazin-5-ylmethyl]benzo nitrile.

25 25. A preventive or therapeutic agent for multiple sclerosis, which comprises the compound of claim 1, or a salt or hydrate thereof, wherein the compound represented by formula (I) is any one of the compounds selected from the group consisting of:

7-(2-butynyl)-2-cyano-1-methyl-8-(piperazin-1-yl)-1,7-dihydropurin-6-one,
 3-(2-butynyl)-5-methyl-2-(piperazin-1-yl)-3,5-dihydroimidazo[4,5-d]pyridazin-4-one,
 2-(3-aminopiperidin-1-yl)-3-(2-butynyl)-5-methyl-3,5-dihydroimidazo[4,5-d]pyridazin-4-one,
 2-[7-(2-butynyl)-1-methyl-6-oxo-8-(piperazin-1-yl)-6,7-dihydro-1H-purin-2-yl]benzamide,

7-(2-butynyl)-1-(2-cyanobenzyl)-6-oxo-8-(piperazin-1-yl)-6,7-dihydro-1H-purine-2-carbonitrile,
and

2-[3-(2-butynyl)-4-oxo-2-(piperazin-1-yl)-3,4-dihydroimidazo[4,5-d]pyridazin-5-ylmethyl]benzo
nitrile.